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> The function of education is to teach one to think intensively and to think critically Intelligence plus character—that is the goal of true education

CSIR NET - GENERAL APTITUDE

QUANTITATIVE APTITUDE

L-16

Probability

IfAS

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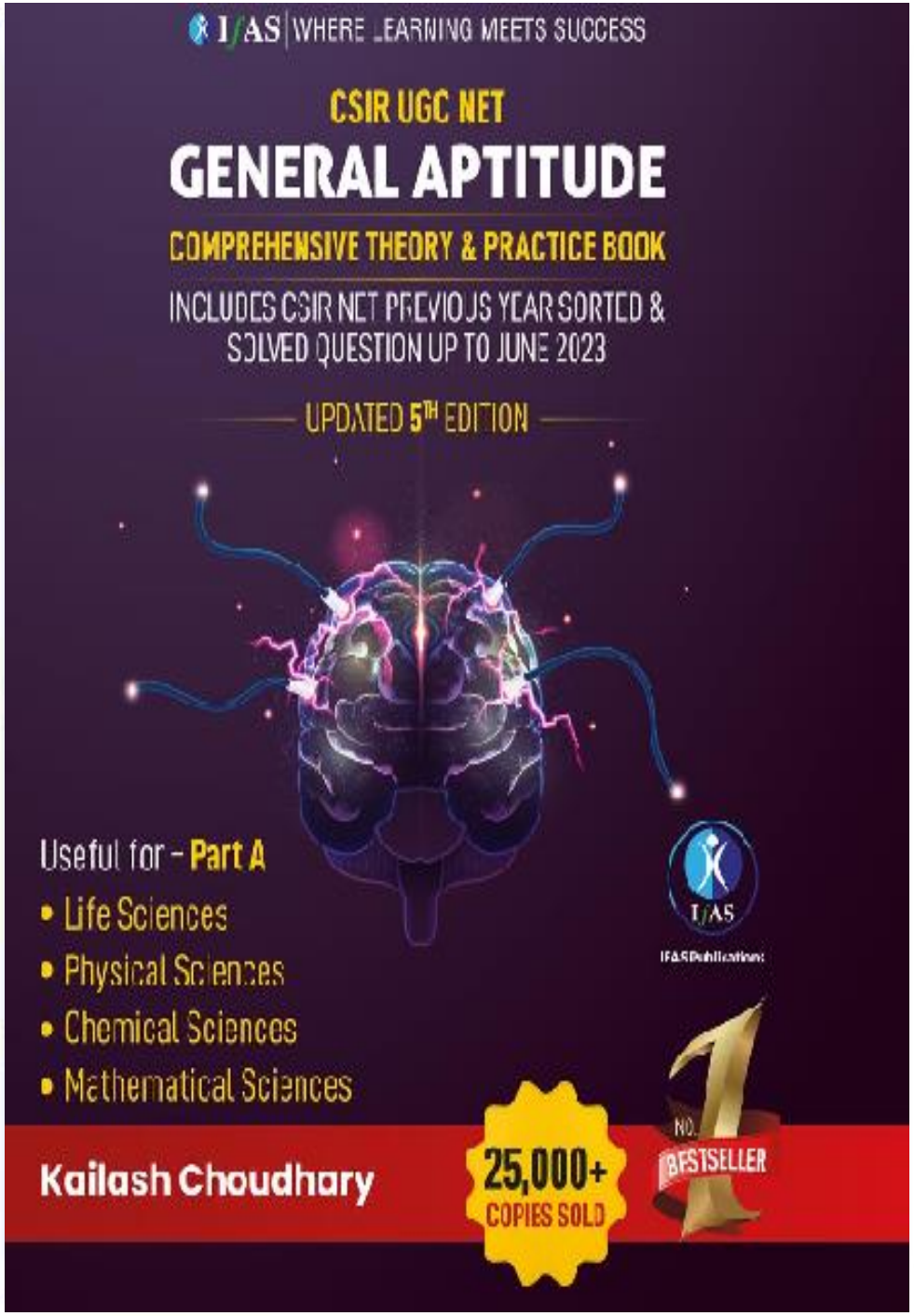
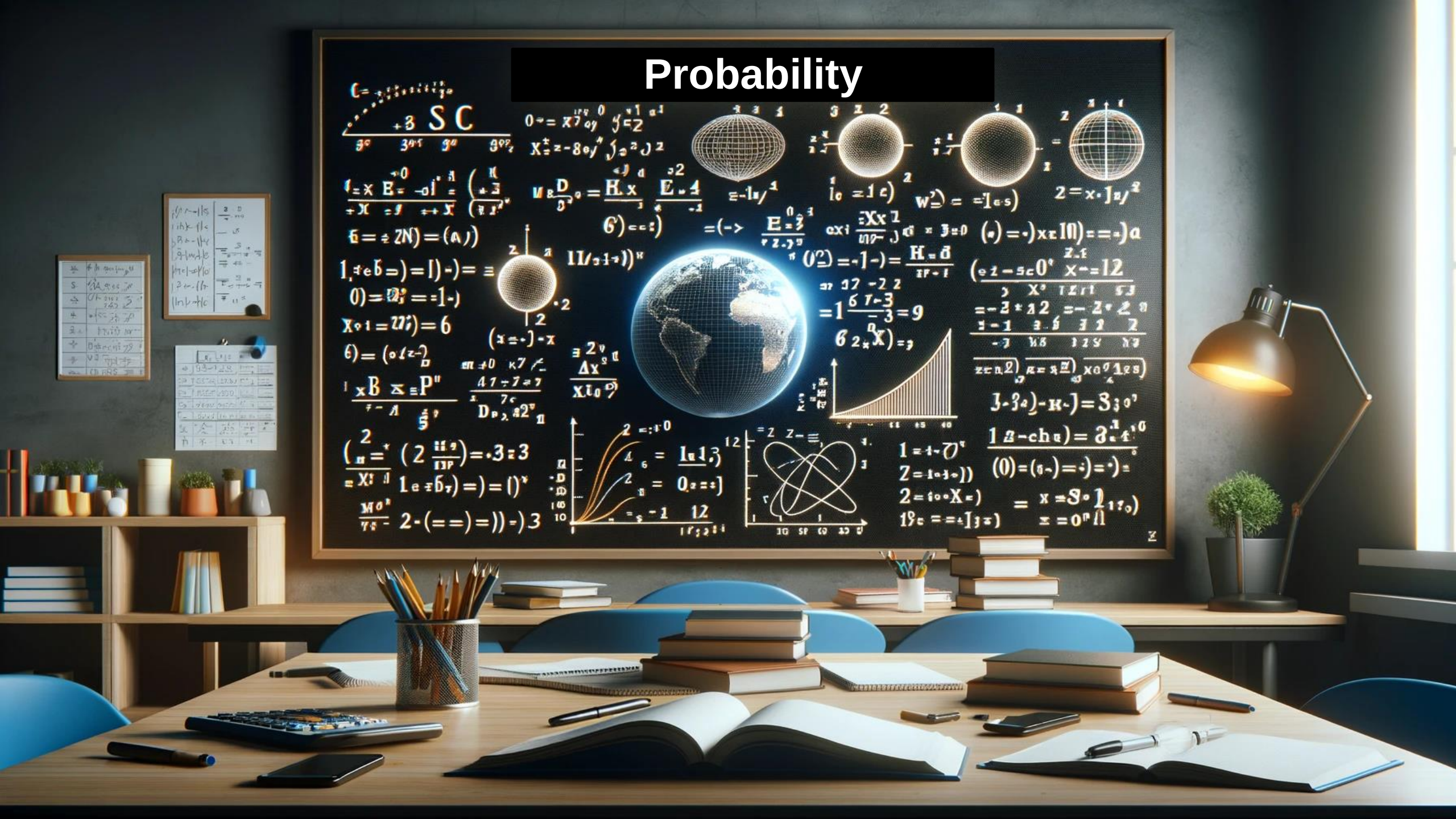


Topic Covered in Today's Session

1. What is probability?
2. Tossing a coin
3. Rolling a die
4. Deck of playing cards
5. Practice questions

Probability



What is probability ?

Probability is the measure of the likelihood that an event will occur.

Range → (H, T)

$0 \leq P(E) \leq 1$

Probability of an Event

P (Event) = $\frac{\text{No. of fav. outcome}}{\text{Total outcome}}$

Tossing coins

No of Outcomes = 2^n

① Tossing 1-times

Sample space = { H, T }

② Tossing 2-times

Sample space = { HH, TT, HT, TH }

③ Tossing 3-times $(2^3 = 8)$

Sample space = [HHH, HHT, HTH, HTT
TTT, TTH, THT, THH]

No. of outcomes = 6^n

Rolling die/dice

① Rolling a Die $(6^1 = 6)$

Sample space = $\{1, 2, 3, 4, 5, 6\}$

② Rolling 2-times $(6^2 = 36)$

Sample space = $\{\quad\}$

		White Die					
		1	2	3	4	5	6
Red Die	1	(1,1)	(2,1)	(3,1)	(4,1)	(5,1)	(6,1)
	2	(1,2)	(2,2)	(3,2)	(4,2)	(5,2)	(6,2)
	3	(1,3)	(2,3)	(3,3)	(4,3)	(5,3)	(6,3)
	4	(1,4)	(2,4)	(3,4)	(4,4)	(5,4)	(6,4)
	5	(1,5)	(2,5)	(3,5)	(4,5)	(5,5)	(6,5)
	6	(1,6)	(2,6)	(3,6)	(4,6)	(5,6)	(6,6)

Duplet

$P(\text{Doublet}) = \frac{6}{36} = \frac{1}{6}$

③ Rolling 3 times

$6^3 = 216$

$4 \to 2^2$

2^2

(3,2) (5,2) (2,3) (2,5)

Deck of playing cards

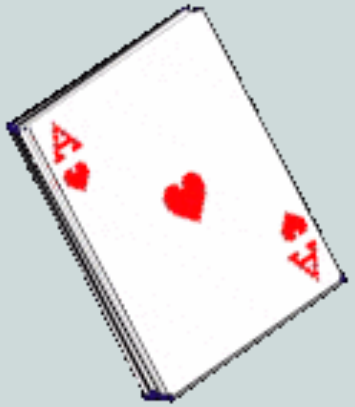
(52 cards)

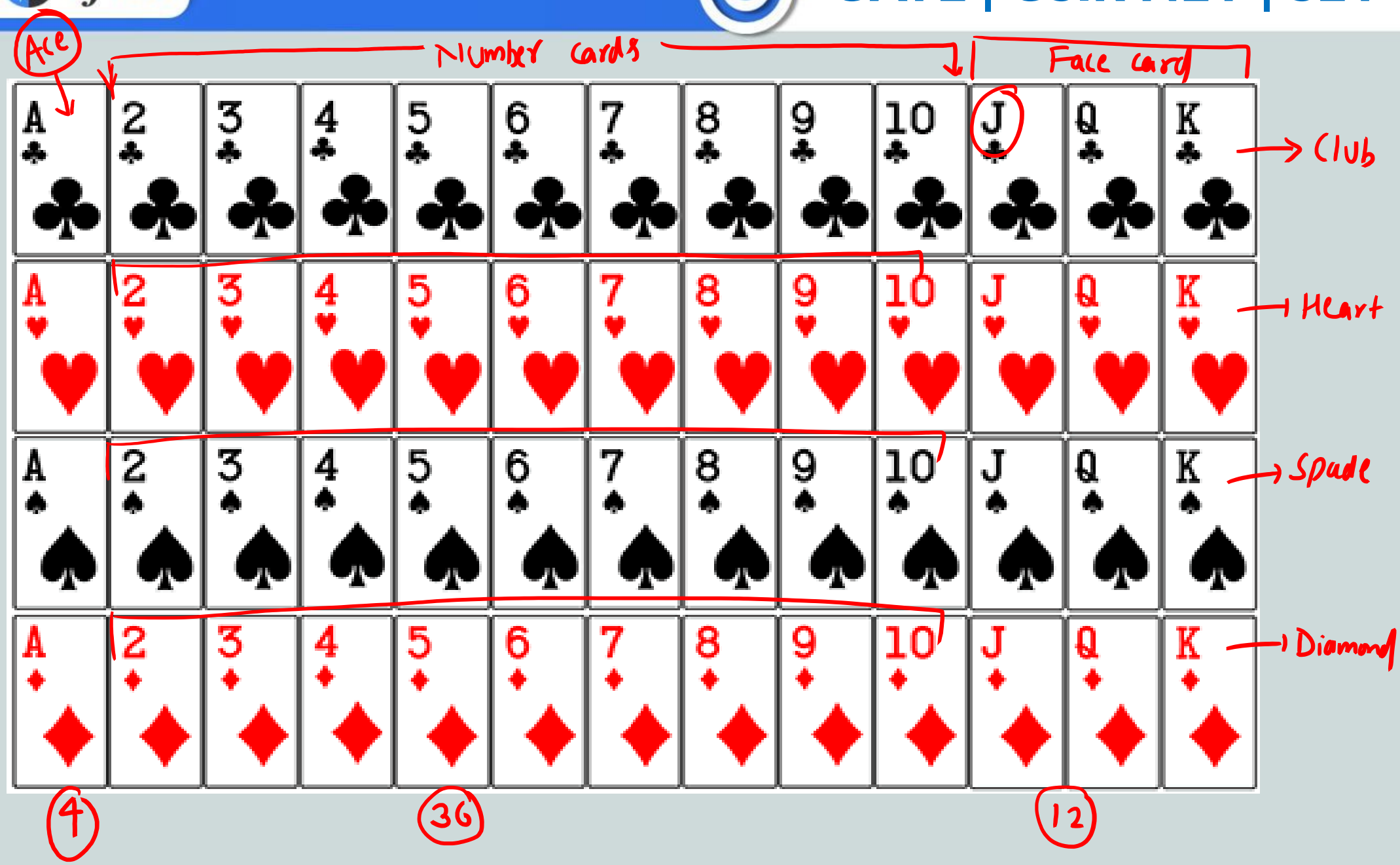
SUITS

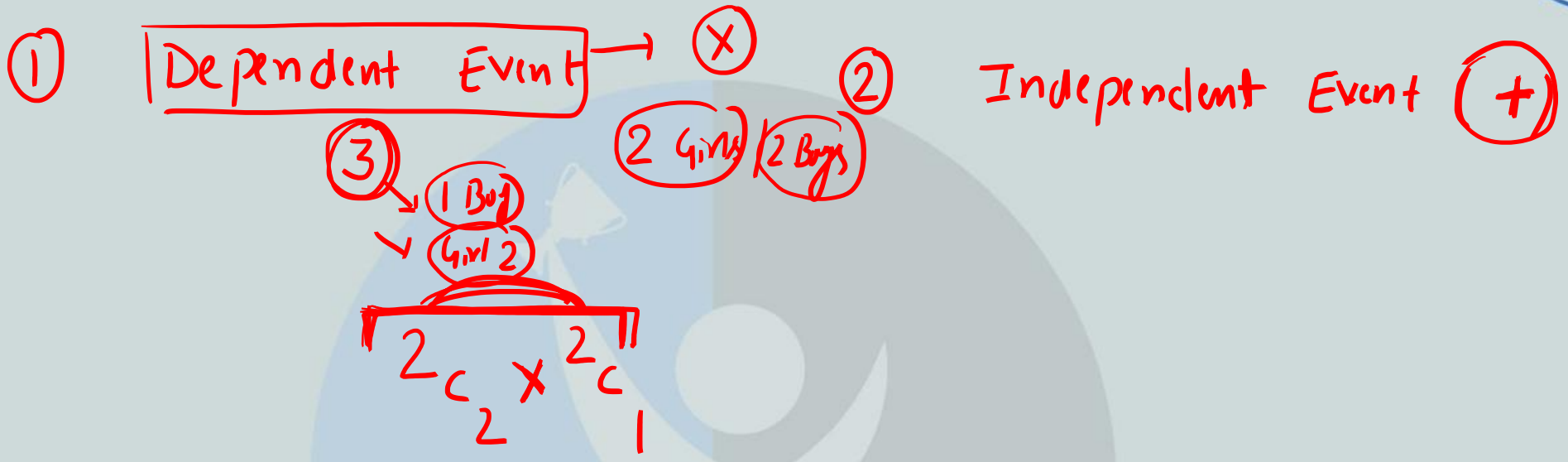
26 Black

26 Red

- Clubs (♣) → 13
- Spades (♠) → 13
- Diamonds (♦) → 13
- Hearts (♥) → 13




Ace
Number cards
Face card
Club
Heart
Spade
Diamond
4
36
12


1
Dependent Event
X
2
Independent Event
+
2 Girls
2 Boys
3
1 Boy
Girl 2
$^2C_2 \times {}^2C_1$

Q1. Three fair cubical dice are thrown, independently. What is the probability that all the dice read the same?

(111) (222) (333) (444) (555) (666)

1. 1/6
2. 1/36
3. 1/216
4. 13/216

$$P(E) = \frac{6}{6^3 6^2} = \frac{1}{36}$$ Ans

Q2. A fair cubic die is rolled 5 times and we get the face with number 1 all 5 times on top. The probability of getting the same face on the sixth trial is:

PYQ

1.(1-5/6)(1/6)
2. (1/6)
3. (1/6)6
4. 5/6

$P(F) = \frac{1}{6}$

Q3. A bag contains 3 red, 5 blue and 4 green ball. 1 ball is drawn at random. What is the probability of ball being either red or blue colour.

(a) 3/7
(b) 2/3
(c) 5/12
(d) 1/3

$$P(\text{Either Red or blue}) = \frac{(3+5)}{(3+5+4)} = \frac{8}{12} = \frac{2}{3}$$

Q4. A drawer contains 6 red socks and 4 blue socks. What is the probability that if 2 socks are picked (without looking) from the drawer, both of the socks will be red?

(1) 2/15
(2) 4/15
(3) 1/3
(4) 2/5

10

$$P(\text{Both are Red}) = \frac{6}{10} \times \frac{5}{9} = \frac{1}{3}$$

2 2

6 – Red
+ 4 = Blue
10

$$\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8} \times \frac{3}{7}$$

Q5. Find the probability of getting a sum of 7 or 11 in a simultaneous throw of two dice.

(1) 2/9 (2) 4/9 (3) 6/9 (4) 8/9

$$P(E) = \frac{8}{36} = \frac{2}{9}$$

Q6. Two dices are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

(A)1/9 (B) 2/9 (C) 1/3 (D) 4/9

$$P(E) = \frac{8}{36} = \frac{2}{9}$$

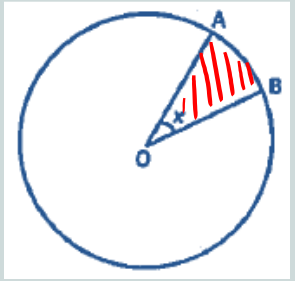
Q7. Two dice are thrown simultaneously. What is the probability of getting prime numbers on both and sum of numbers on both dice is not divisible by 2?

(a) 1/12
(b) 1/18
(c) 1/9
(d) 1/6

$$P(E) = \frac{4}{36} = \frac{1}{9}$$

Q8. A point is chosen at random from a circular disc shown below.

PYQ



$2\pi \rightarrow \frac{\pi r^2}{2\pi} \cdot x$

$1 \rightarrow$

x

$360^\circ = 2\pi$ radians

$180^\circ = \pi$ radians

What is the probability that the point lies in the sector OAB? (where angle AOB = *x* radians)

(1) $\frac{2x}{\pi}$ (2) $\frac{x}{\pi}$

(3) $\frac{x}{2\pi}$ (4) $\frac{x}{4\pi}$

$P(E) = \frac{\text{Area of sector}}{\text{Total Area of circle}}$

$= \frac{\frac{\pi r^2}{2\pi} \cdot x}{\pi r^2} = \frac{x}{2\pi}$

$\frac{\frac{r^2}{2} x}{\pi r^2} = \frac{x}{2\pi}$

Area of sector $= \frac{\pi r^2 \theta}{2\pi}$ $\frac{r^2\theta}{2}$

Q9. What is the chance that a leap year, selected at random, will contain 53 Saturdays?

(A) 2/7
(B) 3/7
(C) 1/7
(D) 5/7

366 → 52 weeks + 2 days extra

365 → 52 + 1

M
T
W
Th
Fri
Sat
Sun

1/7

M - Tues
Tues - wed
wed - Th
Th - Fri
Fri - sat
Sat - Sun
Sun - mon

$P(E) = \frac{2}{7}$ Ans

Q10. The probability that a ticketless traveller is caught during a trip is 0.1. If the traveller makes 4 trips, the probability that he/she will be caught during at least one of the trips is:

(1) $1 - (0.9)^4$

(2) $(1 – 0.9)^4$

(3) $1 - (1 – 0.9)^4$

(4) $(0.9)^4$

Q11. A box contains 12 red, 6 green and 'x' yellow balls. Probability of choosing one green ball out of the box is 2/9, then find the probability of choosing one ball which can be either red or yellow?

(a) 4/9
(b) 5/9
(c) 2/3
(d) 7/9

$$P(\text{Red or yellow}) + P(\text{green}) = 1$$

$$P(\text{Red or yellow}) = 1 - \frac{2}{9}$$

$$= \frac{9-2}{9} = \frac{7}{9} \text{ Ans}$$

Q12. 12 balls, 3 each of the colour red, green, blue and yellow are put in a box and mixed. If 3 balls are picked at random, without replacement, the probability that all 3 balls are of the same color is

(1) 1/4 (2) 1/12

(3) 1/36 (4) 1/55

$P(\text{All are Red}) = \frac{3}{12} \times \frac{2}{11} \times \frac{1}{10} = \frac{1}{220}$

$P(\text{All 3 balls of same colour}) \Rightarrow 4 \times \frac{1}{220}$

$= \frac{1}{55}$

Q13. Two students are solving the same problem independently. If the probability that the first one solves the problem is $\frac{3}{5}$ and the probability that the second solves the problem is $\frac{4}{5}$.

What is the probability that at least one of them solves the problem?

(1) $\frac{17}{25}$ (2) $\frac{19}{25}$

(3) $\frac{21}{25}$ (4) $\frac{23}{25}$

Q14. Consider a solid cube of side 5 units. After painting, it is cut into cubes of 1 unit. Find the probability that a randomly chosen unit cube has only one side painted.

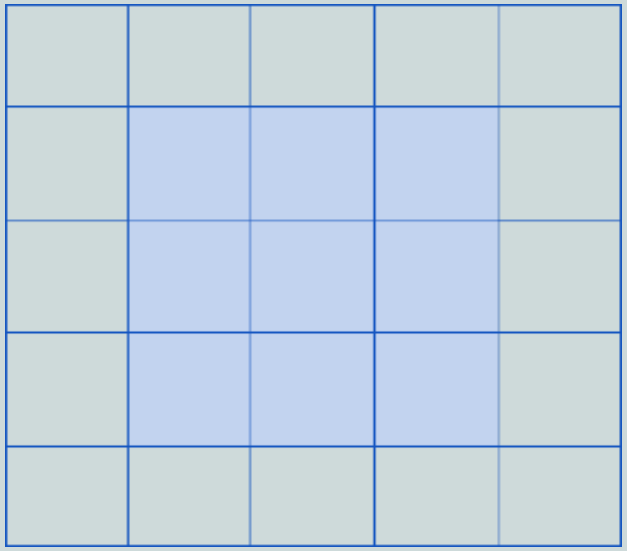
(1) 56/125 (2) 36/125

(3) 44/125 (4) 54/125

Consider a solid cube of side 5 units. After painting, it is cut into cubes of 1 unit. Find the probability that a randomly chosen unit cube has only one side painted.

(1) 56/125 (2) 36/125

(3) 44/125 (4) 54/125



Q15. A class of twelve children has two more boys than girls. A group of three children are randomly picked from this class to accompany the teacher on a field trip. What is the probability that the group accompanying the teacher contains more girls that boys?

(A) 4/11 (B) 34/71 (C) 5/12 (D) 21/37

Q16. Find the probability of eight letters word that can be formed from the letters of the word 'BLASTING' so that vowels always come together.

(a) 1/4
(b) 2/5
(c) 1/3
(d) 10/21

[AI] BLSTNG
1 1 1 1 1 1

$$P(\text{Vowels come together}) = \frac{2!\,7!}{8!} = \frac{2 \times 7!}{8 \times 7!} = \frac{1}{4}$$

Q17. A bag contains x green balls, 7 blue balls and 8 red balls. When two balls are drawn from bag randomly, then the probability of one ball being green and one ball being red is 4/15. Find value of x (number of green balls cannot be more than 18 balls).

(a) 3
(b) 5
(c) 10
(d) 9

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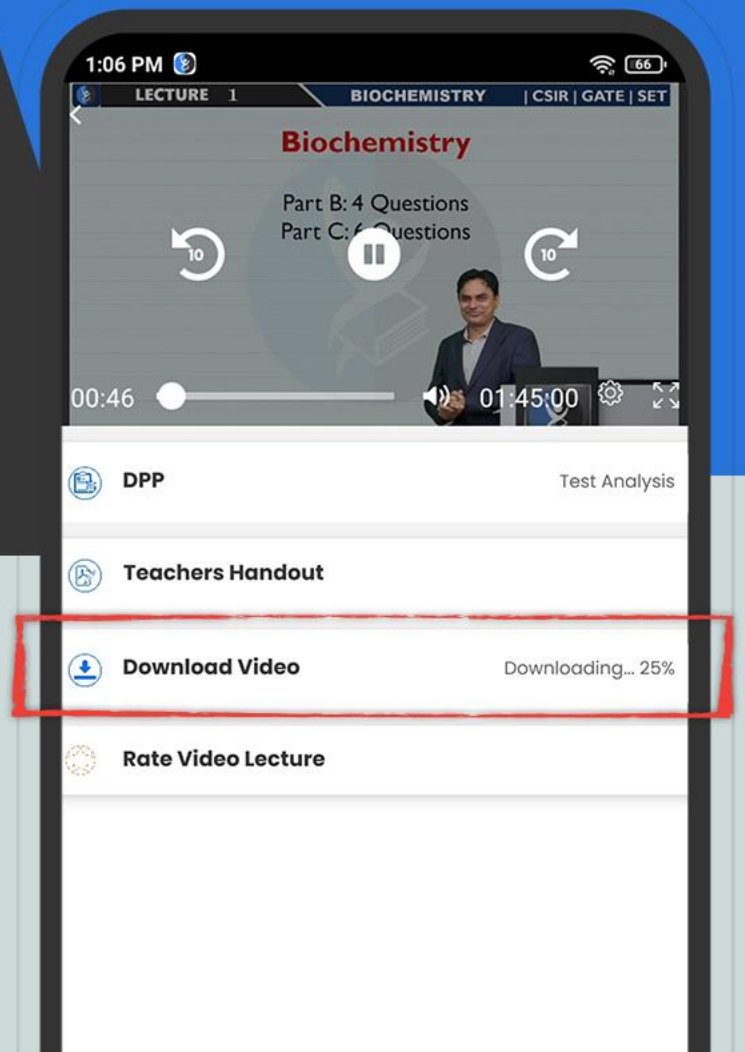

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